DOCUMENT RESUME

ED 191 677 SE 031 747

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TITLE Special Report on Mathematics.
INSTITUTION Illinois State Board of Education, Springfield.
PUB DATE Feb 80
NOTE 23p.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Census Figures; Educational Opportunities; *Mathematics Curriculum; *Mathematics Education; Mathematics Instruction; *School Demography; School Statistics; Secondary Education; *Secondary School Curriculum; *Secondary School Mathematics; Sex Differences; Student Attitudes; Student Characteristics
IDENTIFIERS *Mathematics Education Research

ABSTRACT

This special report on mathematics education in the Illinois secondary schools is based on a statewide census taken in 1979. The census was designed to produce normative data relative to offerings and enrollments in Illinois public secondary schools and to establish a source of data on secondary school curriculum at the peak of public high school enrollment. Some highlights of the report are: (1) Typical mathematics course offerings in both junior and senior high schools vary little throughout the state; (2) Community type is a better indicator of mathematics enrollment patterns than school size; (3) Most high school mathematics is elective, required courses in high school are more likely in rural and suburban schools; (4) Enrollment in mathematics in grades seven and eight is predominantly required; (5) Male enrollment exceeds female enrollment in nine out of eleven typical high school mathematics courses; (6) Male enrollment in remedial mathematics exceeds female by 26% in both junior and senior high schools; and (7) Less than 1% of the enrollment in high schools is in advanced courses such as calculus, analytical geometry, or probability and statistics. (Author/MP)

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Illinois Secondary School Course Offerings

Illinois State Board of Education

Research and Statistics

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Special Report on Mathematics

SE 031 747

SPECIAL REPORT ON MATHEMATICS

February, 1980

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FOREWORD

In 1977 the Illinois State Board of Education in cooperation with the Illinois Association for Supervision and Curriculum Development conducted a Census of Secondary School Course Offerings, Enrollments, and Cocurricular Activities. This was the first such statewide census of basic curriculum data in Illinois. The Census was designed to produce normative data relative to offerings and enrollments in Illinois public secondary schools and to establish a source of data on secondary school curriculum at the peak of public high school enrollment.

The Census project was conducted and the general report was written by Dr. William L. Humm, Research Scientist, Research and Statistics Section, Illinois State Board of Education. This special report on mathematics was written by Dr. Gordon Lindstrom, Science Department, Proviso Township High School District 209, and edited by Dr. Humm. It is based on statistics from the Census project.

Observations and conclusions in this report are those of the writer and do not necessarily represent policies or views of the Illinois State Board of Education or the State Superintendent of Education.

Joseph M. Cronin

Joseph M. Cronin
State Superintendent of Education

Highlights

* The typical mathematics course offerings in both junior high and high schools vary little throughout the state. Although larger schools may offer a few more courses, the predominant enrollment is in a relatively common core of courses.

* Community type of school appears to be a better indicator of differences in mathematics enrollment patterns than does school size.

* Most enrollment in high school level mathematics is elective. Among the typically offered courses, required mathematics courses are more likely to be found in rural and suburban schools.

* Enrollment in general mathematics grades 7 and 8 is predominantly required.

* Male enrollment exceeds that of females in 9 out of 11 of the most typical high school mathematics courses.

* In both junior high and high schools, male enrollment exceeds female enrollment in remedial math by 26 percent.

* Less than one percent of the enrollment in high schools is in advanced courses such as calculus, analytic geometry, or probability and statistics.

THE PURPOSE: THE ANALYSIS

This report attempts to describe the typical mathematics course offerings in Illinois public junior high and high schools. It examines mathematics enrollment by school size and community type, as well as differences in enrollment patterns of females and males.

Enrollment data from the Illinois Census of Secondary School Course Offerings can be summarized in a number of ways to show the typical course of study for a specific subject area. To interpret the findings from the large volume of course offerings data, it is necessary to reduce and categorize the data according to criteria that capitalize on their usefulness in describing the status of courses in the secondary schools. Then, the findings may be most beneficial in making decisions about state, regional, and local programs of study.

When one's interest is the subjects in which most students are enrolled, percentage of enrollment can be one means of reducing the volume of data. The percentage of enrollment that is used as a criterion for making this reduction can be determined from the census data; natural points of separation among different enrollment volumes occur. That approach has been taken in this report.

THE SCHOOLS IN THE CENSUS: DEMOGRAPHIC CHARACTERISTICS

Census data were collected from 459 public junior high schools and 704 public high schools. The participating schools represent 97.0 percent of the junior high schools and 95.4 percent of the high schools in the defined population of the Census.

Schools were classified by grade level composition, by school size, and by community type. Schools classified as junior high schools were typically two-year, grade 7-8 schools (88 percent). Another 10 percent were three-year, grade 7-9 schools. High schools included four-year, grade 9-12 schools (75 percent); three-year, grade 10-12 schools (5 percent); and junior-senior high schools including grades 7-12 (16 percent).

There is a direct relationship between school size and community type, with larger schools located in central cities, smaller schools in rural areas. This relationship is particularly strong for high schools, as indicated in Table D-1. Most of the rural high schools (97 percent) had under 1000 students, even when six-year (7-12) schools were included. On the other hand, 66 percent of the urban schools had enrollments over 1000. Table D-2 shows the range and quartile data for high schools in the Census.

Table D-3 presents data by school size and community type for junior high schools. Junior high schools generally enrolled over 500 students (90 percent) in central cities, between 200 and 1000 in suburbs (93 percent) and independent cities (80 percent), and under 500 (95 percent) in rural areas. Table D-4 gives the range and quartile data for junior high schools in the Census.

TABLE D-1. ILLINOIS PUBLIC HIGH SCHOOLS INCLUDED IN THE CENSUS OF COURSE OFFERINGS BY SIZE AND COMMUNITY TYPE

Size	Community Type: Central City		Suburb		Independent City		Rural		All	%
<200	3		2		1		112		118	16.8
200-499	6		8		36		181		231	32.8
500-999	7		17		40		49		113	16.1
1000-1699	25		48		19		6		98	13.9
1700-2599	36	83%	52	94%	5	94%	3	97%	96	13.6
2600 or >	18		30		0		0		48	6.8
ALL	95		157		101		351		704	
%	13.5		22.3		14.3		49.9			

TABLE D-2. ENROLLMENT SUMMARY STATISTICS FOR PUBLIC HIGH SCHOOLS INCLUDED IN THE CENSUS OF COURSE OFFERINGS

Mean	Smallest	25th Percentile	Median	75th Percentile	Largest
951.5	24	264	504	1511	4869

TABLE D-3. ILLINOIS PUBLIC JUNIOR HIGH SCHOOLS INCLUDED IN THE CENSUS OF COURSE OFFERINGS BY SIZE AND COMMUNITY TYPE

Size	Community Type: Central City		Suburb		Independent City		Rural		All	%
<200	0		9		15		59		83	18.1
200-499	3		105		46		40		194	42.3
500-999	22	90%	117	93%	23	80%	5	95%	167	36.4
1000 or >	4		9		2		0		15	3.3
ALL	29		240		86		104		459	100.0
%	6.3		52.3		18.7		22.7			

TABLE D-4. ENROLLMENT SUMMARY STATISTICS ON PUBLIC JUNIOR HIGH SCHOOLS INCLUDED IN THE CENSUS OF COURSE OFFERINGS

Mean	Smallest	25th Percentile	Median	75th Percentile	Largest
451.5	37	237	416	632	1321

These demographic data are important for two reasons. First, they substantiate the scope of the data-gathering effort and justify use of the term "Census," since virtually all designated schools in fact submitted the requested data to the State Board of Education. Thus, the findings based on the data have enhanced value for decisionmakers. Second, they provide a foundation for investigating the relationship between course offerings and course requirements on the one hand, with course enrollments on the other. For while data on school expenditures, facilities, personnel, and overall enrollments have been routinely gathered, data on how these inputs have been combined to provide the visible, operating school program as experienced by students have been lacking.

THE TYPICAL MATHEMATICS PROGRAM IN ILLINOIS HIGH SCHOOLS

For purposes of data analysis, mathematics courses will be considered typical if they enroll 3 percent or more of the total state high school enrollment. Table 1 includes eight courses that meet this criterion. Of the remaining courses offered in mathematics, only three account for more than 1% of the total state enrollment (algebra-trigonometry--1.6%, computer math/computer science/programming--1.0%, and advanced general math, grades 9-12--1.9%). All other courses account collectively for 14.6% of the state-wide math enrollment, while the eight courses considered typical in this report account for 77.3% of all math enrollment.

The typical program of studies in mathematics as determined by the three percent criterion is: pre-algebra--3.2%; elementary algebra--12.5%; intermediate algebra--6.7%; advanced algebra--3.8%; elementary general math, grades 9-12--4.8%; plane geometry--7.8%; integrated plane and solid geometry--3.2%; and remedial math, grades 9-12--4.0%.

TABLE 1. MATHEMATICS COURSES WITH 3% OR MORE OF ILLINOIS HIGH SCHOOL STUDENTS ENROLLED

Course Title	# of Schools Offering Course	% of State Total	% of State Enrollment
Pre-Algebra	110	15.6	3.2
Elementary Algebra	548	77.8	12.4
Intermediate Algebra	457	64.9	6.7
Advanced Algebra	401	56.9	3.8
Elementary General Math Grades 9-12	429	60.9	4.8
Plane Geometry	466	66.2	7.9
Integrated Plane and Solid Geometry	217	30.8	3.2
Remedial Math	238	33.8	4.0

Typical High School Mathematics Program by Community Type

One course, algebra-trigonometry, is added to the list of typical courses when the criterion of 3% is used to determine typical course offerings by community type. Table 2 shows the enrollment in each course as a percentage of state enrollment plus the number of schools in each community type that offer the course.

Table 2 reveals a marked difference between central city high schools and other high schools in the state for pre-algebra enrollment, both in percentage of students and in percentage of schools that offer the course. One-tenth of the central city students enroll in pre-algebra while less than one percent of the students in rural, suburban, or independent city schools enroll in that course. Seven-tenths (66) of the central city high schools offer pre-algebra, whereas 6%, 4%, and 11% of the rural, independent city, and suburban schools respectively offer the course.

Enrollment in elementary algebra shows some variation among the types of schools, but the more significant differences occur in intermediate and advanced algebra. With the exception of independent city schools, enrollment from elementary to intermediate to advanced algebra declines by approximately one third of the elementary algebra enrollment for rural and suburban schools. Central city schools, however, show a steep decline in enrollment from elementary algebra to intermediate and advanced algebra, 14% to 2% and 1/2% respectively.

TABLE 2. MATHEMATICS COURSES WITH 3% OR MORE OF HIGH SCHOOL STUDENTS IN THE STATE ENROLLED BY COMMUNITY TYPE: Number of Schools Offering Courses(n) and Percent of Statewide Enrollment (%)

	Rural		Independent City		Suburb		Central City	
Course Title	n	%	n	%	n	%	n	%
Pre-Algebra	22	0.8	4	0.4	18	0.9	66	9.9
Elementary Algebra	238	9.4	70	8.7	150	13.6	90	14.4
Intermediate Algebra	219	6.5	80	9.3	135	9.3	23	1.6
Advanced Algebra	192	3.3	74	4.9	120	5.7	15	0.5
Algebra-Trigonometry	33	0.5	19	0.7	46	1.3	62	3.3
Elementary General Math Grades 9-12	241	7.1	68	6.0	96	5.2	24	2.1
Plane Geometry	202	4.9	70	7.2	117	8.7	77	8.8
Integrated Plane and Solid Geometry	91	2.6	31	3.1	75	4.8	20	1.1
Remedial Math Grades 9-12	72	1.5	27	1.6	74	1.9	65	10.3
	N = 351		N = 101		N = 157		N = 95	

An increase in enrollment plus an increase in the percentage of schools that offer the course occur when comparing rural to independent city to suburban to central city schools for algebra-trigonometry.

Enrollment in elementary general math, grades 9-12, is highest in rural schools (7%), lowest in central city schools (2%), and similar for suburban (5%) and independent city (6%) schools. Enrollment in remedial math-grades 9-12 is highest (10%) in central city schools. Only 1.5% of rural, 1.6% of independent city, and 1.9% of suburban pupils are enrolled in this course. Perhaps in these latter three community types, students' needs for remediation are provided for in their elementary general math courses. This would account for higher percentages of enrollment in the elementary general math courses: 7% rural, 6% independent city, and 5% suburban in comparison to 2% central city.

Plane geometry enrollment in rural high schools is approximately three-fifths that in other types of schools. Percents of state enrollment are 5% for rural, 7% for independent city, 9% for suburban, and 9% for central city schools. This could be due, in part, to a smaller percentage of rural high schools offering the course: 202 of 351 or 57% compared to 70% of independent city, 74% of suburban, and 81% of central city schools. Integrated plane and solid geometry enrollment is approximately half that of plane geometry in all types of schools except central city where it is approximately 12%.

The variation in the statistics presented in Table 2 suggests a question for further study. What are the key determinants in high school mathematics offerings--and to what extent are they related to community type?

Typical High School Mathematics Program by School Size

Table 3 gives the enrollment by school size in courses that have been called typical in this report. As school size increases, there is an increase in enrollment in pre-algebra, advanced algebra, algebra-trigonometry, plane geometry, integrated plane and solid geometry, and remedial math-grades 9-12. An exception in this pattern occurs as small decreases in advanced algebra and integrated plane and solid geometry in schools larger than 1699 students. These courses comprise six of the eight listed in Table 1 as typical course offerings. The percentage of schools in each category that offer a particular course also correlates with the percentage of students enrolled.

Elementary general math-grades 9-12 shows lower enrollment as school size increases, while elementary algebra and intermediate algebra show no pattern of enrollment with respect to school size.

TABLE 3. MATHEMATICS COURSES WITH 3% OR MORE OF HIGH SCHOOL STUDENTS IN THE STATE ENROLLED BY SCHOOL SIZE: Number of Schools Offering Course (n) and Percent of Statewide Enrollment (%) by School Size

Course Title	< 200		200 to 499		500 to 999		1000 to 1699		1700 to 2599		2600 > or	
	n	%	n	%	n	%	n	%	n	%	n	%
Pre-Algebra	6	0.8	23	1.1	9	1.3	17	2.4	36	4.5	19	4.5
Elementary Algebra	81	9.5	154	9.2	88	10.4	85	13.5	93	13.7	47	12.9
Intermediate Algebra	65	6.0	142	6.4	86	8.8	73	7.6	59	5.4	32	6.9
Advanced Algebra	54	3.0	129	3.3	73	3.8	65	4.3	57	4.2	24	3.1
Algebra-Trigonometry	9	0.2	24	0.4	16	0.7	32	1.3	50	2.1	29	2.3
Elementary General Math Grades 9-12	74	7.7	156	7.1	78	7.2	51	4.8	50	3.6	20	3.7
Plane Geometry	65	4.7	129	4.9	79	6.4	70	7.8	81	8.9	42	9.0
Integrated Plane & Solid Geometry	20	1.6	66	2.4	30	2.7	46	3.7	34	3.6	21	3.1
Remedial Math Grades 9-12	21	1.5	45	1.9	41	2.8	38	3.0	57	5.1	36	5.5
	N=118		N=231		N=113		N=98		N= 96		N=48	

THE TYPICAL MATHEMATICS PROGRAM IN ILLINOIS JUNIOR HIGH SCHOOLS

Some high schools include grades 7 and 8, while most are comprised of grades 9-12 or 10-12 only. This report includes grade 9 enrollment data with high schools. Only grade 7 and 8 data will be treated in this section.

As in the case of high school enrollment, courses that enroll fewer than 3% of the students were not considered typical of the mathematics program. Courses excluded by this criterion collectively constitute 5% of grade 7 and 8 enrollment; the highest percentage for an individual excluded course is for intermediate algebra at 1.6%.

Table 4 lists the typical mathematics program and the percentages of students enrolled in each course for all junior high schools. The typical program is general math-grades 7 and 8, elementary algebra, and remedial math-grades 7 and 8.

Typical Junior High School Mathematics Program by Community Type and School Size

Table 5 gives the enrollment in the four typical junior high math courses by community type as percentages of students in schools of that type. Enrollment in general math-grades 7 and 8 is similar for rural, independent city, and suburban schools, but is lower by approximately 20% in central city schools. Enrollment in elementary algebra is greater in central city schools--9% as compared to 5% in suburban, 7% in independent city, and 5% in rural schools.

The percentage of students enrolled in general math-grades 7 and 8 decreases as school size increases (see Table 6).

As school size increases from less than 200 to 200-499 to 500-999 to 1000 or greater, percentage of enrollment in grade 7 general math decreases from 48% to 45% to 41% to 34% respectively, and percentage of enrollment in general math-grade 8 decreases from 48% to 44% to 39% to 36%.

Elementary algebra and remedial math grades 7 and 8 show an increase in enrollment with an increase in school size. Increases for elementary algebra are 2% to 4% to 7% to 11%, and for remedial math-grades 7 and 8, 2.1% to 3.0% to 3.2% to 3.8%.

TABLE 4. MATHEMATICS COURSES WITH 3% OR MORE OF GRADE 7 AND 8 JUNIOR HIGH SCHOOL STUDENTS IN ILLINOIS ENROLLED

Course Title	# of Schools Offering Course	% of State Total	% of State Enrollment
General Math Gr 7	440	95.9	42.2
General Math Gr 8	446	97.2	40.6
Elementary Algebra	179	39.0	6.0
Remedial Math Gr 7-8	96	20.9	3.1

TABLE 5. MATHEMATICS COURSES WITH 3% OR MORE OF GRADE 7 AND 8 STUDENTS ENROLLED: Percent of Total Junior High Enrollment by Community Type

Course Title	Rural	Independent City	Suburb	Central City
General Math Gr 7	43.0	40.5	43.8	34.9
General Math Gr 8	42.8	39.2	42.4	31.4
Elementary Algebra	5.1	7.0	5.5	8.8
Remedial Math Gr 7-8	3.0	3.2	2.9	4.2

TABLE 6. MATHEMATICS COURSES WITH 3% OR MORE OF GRADE 7 AND 8 JUNIOR HIGH SCHOOL STUDENTS ENROLLED BY SCHOOL SIZE

Course Title	< 200	200 - 499	500 - 999	1000 or >
General Math Gr 7	48.4	45.3	41.1	33.8
General Math Gr 8	47.7	44.1	38.9	36.1
Elementary Algebra	2.3	4.2	6.7	10.9
Remedial Math Gr 7-8	2.1	3.0	3.2	3.8

THE REQUIREL HIGH SCHOOL MATHEMATICS COURSES

Table 7 shows that with the exception of elementary general math-grades 9-12, required status accounts for only a small percent of enrollment in the typical math courses. The data raise some questions. For example, six schools require remedial math, but it seems improbable that all students in these six schools are required to enroll in remedial math unless each is a special school enrolling only students in need of special help. It is more likely that remedial math is a requirement if another course is not taken, a course such as algebra which students not in need of remediation take to fulfill a math requirement. Also, advanced algebra and geometry are required in some schools. One can speculate that the few schools that do require these courses are schools of academic specialty.

TABLE 7. NUMBER AND PERCENT OF ILLINOIS HIGH SCHOOLS THAT REQUIRE THE TYPICAL MATHEMATICS COURSES AND PERCENT OF TOTAL STATE ENROLLMENT IN THOSE SCHOOLS.

Course Title	# of Schools Requiring The Course	% of State Total	% of State Enrollment in Course
Pre-Algebra	0	0.0	0.0
Elementary Algebra	29	4.1	3.5
Intermediate Algebra	16	2.3	4.9
Advanced Algebra	6	0.9	3.8
Elementary General Math Grades 9-12	47	6.7	10.9
Plane Geometry	3	0.4	2.0
Integrated Plane and Solid Geometry	2	0.3	2.9
Remedial Math Gr 9-12	6	0.9	1.9

Typical High School Math Courses That Are Required by Community Type and School Size

Noticeable patterns of enrollment occur in required mathematics courses when viewed by community type (see Table 8). A smaller percent of students enrolled in central city math courses are there because the course is required than is the case for other community types. Only elementary general math-grades 9-12, accounting for 18% of the enrollment, and elementary algebra, accounting for 0.6% of the enrollment are required in central city schools.

Among the courses required by independent city schools are: elementary general math-grades 9-12, elementary algebra, intermediate algebra, remedial math-grades 9-12, plane geometry, and advanced algebra. The enrollments in these required courses account for 9%, 7%, 2%, 2%, 1% and 1% of all enrollments respectively in these courses.

TABLE 8. TYPICAL HIGH SCHOOL COURSES THAT ARE REQUIRED BY COMMUNITY TYPE: Number Enrolled(n) and Percent of Total Enrollment in the Course (%)

	Rural		Independent City		Suburb		Central City	
Course Title	n	%	n	%	n	%	n	%
Elementary Algebra	682	6.1	470	6.8	1620	4.1	151	0.6
Intermediate Algebra	325	4.2	141	1.9	1747	6.4	0	0.0
Advanced Algebra	93	2.4	35	0.9	828	5.0	0	0.0
Elementary General Math Grades 9-12	948	11.2	435	9.1	1458	9.7	660	18.0
Plane Geometry	0	0.0	55	1.0	1044	3.9	0	0.0
Integrated Plane and Solid Geometry	40	0.7	0	0.0	591	4.2	0	0.0
Remedial Math Grades 9-12	65	3.6	23	1.8	427	7.7	0	0.0

Suburban and rural schools have the greatest number of required math courses. However, there is no pattern of enrollment within or between those types. The largest percentages of student enrollment accounted for by required status occur for elementary general math for all community types.

Table 9 shows that as school size increases beyond 1699 pupils, elementary algebra is not required or is required for less than 1% of the students. In schools of less than 1700, elementary algebra is required for approximately the same proportion of students; 7.6% for those less than 200, 7.5% for 200-499, 6.7% for 500-999, and 8.6% for 1000 to 1699 enrollment. Required status across school size does not show a pattern for any of the other typical math courses.

TABLE 9. TYPICAL HIGH SCHOOL MATH COURSES THAT ARE REQUIRED BY SCHOOL SIZE: Number Enrolled (n) and Percent of Total Enrollment in the Course (%)

Course Title	<200		200 to 499		500 to 999		1000 to 1699		1700 to 2599		2600 or >	
	n	%	n	%	n	%	n	%	n	%	n	%
Elementary Algebra	128	7.7	527	7.5	558	6.7	1561	8.6	149	0.5	0	0.0
Intermediate Algebra	82	7.7	283	5.8	101	1.5	495	4.8	248	2.2	1004	9.4
Advanced Algebra	0	0.0	128	5.0	0	0.0	0	0.0	667	7.7	161	3.4
Elementary General Math Grades 9-12	329	24.1	549	10.1	352	6.2	1011	15.8	413	5.6	847	14.7
Plane Geometry	0	0.0	55	1.5	0	0.0	229	2.2	0	0.0	775	5.5
Integrated Plane and Solid Geometry	0	0.0	40	2.1	0	0.0	0	0.0	591	8.0	0	0.0
Remedial Math Gr 9-12	9	3.3	79	5.5	0	0.0	272	6.8	155	1.5	0	0.0

THE REQUIRED GRADE 7 AND 8 MATHEMATICS COURSES

The treatment of data in this section parallels that of the earlier section in that part of the data was drawn from junior high school reports and part from high schools that include grades 7 and 8.

Table 10 shows that general math-grades 7 and 8 is required for most students in the state. For general math grade 7, 92% of students in junior high school and 89% of students in high schools that include grade 7 are required to take the course. Corresponding percentages for grade 8 general math are 84% and 89%. However, only 7% of elementary algebra enrollment is attributed to its required status. Remedial math is required for 18% of those students who are enrolled.

The percentage of enrollment in general math-grade 7 is similar for rural, independent city, and suburban schools (see Table 11). It is approximately 8% less for central city schools. The same is true for general math-grade 8. The data lead one to ask why remedial math-grades 7 and 8 is required. Earlier in this report it was speculated that remedial math is required only if students were unsuccessful in general math-grade 7 and 8 or if they enter grade 7 with math deficiencies that exclude them from general math. Thus, they are enrolled in the remedial class to fulfill the school's math requirement.

TABLE 10. REQUIRED GRADE 7 AND 8 MATHEMATICS COURSES

Course Title	# of Schools Requiring The Course		% of State Total That Offer Course		% of State Enrollment in Course	
	J.H.S.	H.S.	J.H.S.	H.S.	J.H.S.	H.S.
General Math Grade 7	403	128	91.6	88.9	91.9	88.5
General Math Grade 8	369	131	82.7	89.7	83.8	89.3
Elementary Algebra	16	*	8.9	*	7.3	*
Remedial Math Grades 7-8	13	*	13.5	*	18.2	*

*Reported with high school data; grade level not distinguished by reporting schools.

TABLE 11. REQUIRED GRADE 7 AND 8 MATHEMATICS COURSES BY COMMUNITY TYPE REPORTED BY JUNIOR HIGH SCHOOLS: Number Enrolled (n) and Percent of Total Enrollment in the Course (%)

Course Title	Rural		Independent City		Suburb		Central City	
	n	%	n	%	n	%	n	%
General Math Gr 7	9,438	95.2	13,274	94.2	51,075	91.5	C575	86.0
General Math Gr 8	9,259	93.7	12,096	88.5	44,610	82.6	4751	69.0
Elementary Algebra	29	2.4	409	16.8	470	6.8	0	0.0
Remedial Math Grade 7-8	70	42.0	95	8.5	733	19.9	53	5.7

THE ENROLLMENT IN HIGH SCHOOL MATHEMATICS BY SEX

Table 12 gives the percent of state male and female enrollments in those mathematics courses which were considered to be typical of the Illinois high school math program. The table includes three additional courses that show a marked contrast between male and female enrollment; they are algebra-trigonometry, advanced general math-grades 9-12, and trigonometry.

Even though the percentages of state male and female enrollments are small (less than 1%) in some cases, a comparison of the two is valid because those percentages are based on almost the entire school population of the state. For example, 1.20% of high school males and 0.78% of high school females are enrolled in trigonometry. It is meaningful to compare these two by saying that the percent of male enrollment exceeds that of females by 54%.

Both advanced and remedial math courses show a higher percentage of males than females enrolled. Percent of male enrollment exceeds percent of female enrollment by 19% in advanced algebra, 27% in algebra-trigonometry, and 54% in trigonometry. Male enrollment exceeds female enrollment by 20% in elementary general math-grades 9-12, and by 26% in remedial math-grades 9-12. The data suggest that females are not encouraged to enroll in advanced math courses as much as males are, or that females do not have the interest or see the need for studying mathematics beyond algebra and geometry. The data also show that males apparently need remediation more than do females.

Enrollment in High School Mathematics by Sex and by Community Type and School Size

Percentages of males enrolled differs from percentages of females enrolled in individual courses in most community types. Male enrollment exceeds female enrollment as a percentage of state enrollment in three-fourths of the 44 course/community type cells shown in Table 13. However, the percent difference between male and female enrollment is similar across community types. Even though a much larger percentage of both sexes in central city schools than in other schools are enrolled in pre-algebra, the relative difference between male and female enrollment is similar to that in suburban and independent city schools. Rural schools show relatively more females enrolled in pre-algebra.

Elementary general math-grades 9-12 is characterized by greater relative differences in male and female enrollment from central city to rural. With male exceeding female enrollment in each case, the differences are 7% for central city, 15% for suburban, 25% for independent city, and 30% for rural. General advanced math-grades 9-12 shows no consistent pattern across community types, but male enrollment in intermediate algebra tends to be higher in more urban schools. Male enrollment in advanced general math-grades 9-12 exceeds female enrollment by 2% in central city, 16% in suburban, 6% in independent city, and 8% in rural schools. Advanced algebra, algebra-trigonometry, trigonometry, and remedial math-grades 9-12, while showing a variation of differences in male and female enrollment across community types, generally have greater relative differences between male and female enrollments than do the other courses listed in Table 14, with male enrollment exceeding female enrollment.

Only one pattern of relative difference between percentage of male and female enrollment is apparent across school size. As school size increases, there is an increase in the number of courses where male enrollment exceeds female enrollment.

TABLE 12. PERCENT ENROLLMENT IN SELECTED HIGH SCHOOL MATHEMATICS COURSES BY SEX

Course Title	Male	Female	% Male > Female
Pre-Algebra	3.31	3.14	5.4
Advanced Algebra	4.09	3.45	18.6
Algebra-Trigonometry	1.76	1.39	26.6
Elementary General Math Grades 9-12	5.21	4.34	20.0
General Math Advanced Grades 9-12	2.03	1.80	12.8
Trigonometry	1.20	0.78	53.8
Remedial Math Gr 9-12	4.46	3.54	26.0

TABLE 13. PERCENT RELATIVE DIFFERENCE IN MALE AND FEMALE ENROLLMENTS IN SELECTED HIGH SCHOOL MATH COURSES BY COMMUNITY TYPE
(Male Percent Relative to Female Percent Shown)

Course Title	Central City	Suburb	Independent City	Rural
Pre-Algebra	7.6	5.5	7.1	-1.4
Elementary Algebra	-0.1	1.9	-3.6	-4.6
Intermediate Algebra	14.9	4.1	-1.0	-6.5
Advanced Algebra	15.2	22.0	11.9	8.9
Algebra & Trig	20.5	44.1	21.3	11.6
Elementary General Math Grades 9-12	7.0	15.2	25.2	29.5
General Math Advanced Grades 9-12	2.3	16.3	6.3	7.5
Plane Geometry	3.1	4.2	-0.6	-1.0
Integrated Plane & Solid Geometry	2.8	-0.4	-4.7	0.0
Trigonometry	82.6	54.5	43.0	40.8
Remedial Math	19.1	46.4	55.3	41.9

NOTE: For these tables negative percents indicate male enrollment is less than female enrollment.

THE ENROLLMENT IN JUNIOR HIGH SCHOOL MATHEMATICS BY SEX

General math-grades 7 and 8 was omitted from Table 14. Comparisons of male and female enrollments in these two courses would be of little value because 92% of grade 7 and 84% of grade 8 pupils are required to enroll in those courses. Differences in male and female enrollments are similar to corresponding courses in high schools with the exception of intermediate algebra, in which male enrollment exceeds that of females by 2% in high schools. However, female enrollment in this course is greater by 15% in junior high schools. Percent of male enrollment exceeds that of females by 26% in grade 7 and 8 remedial math--exactly the same percentage as for grade 9-12 remedial math reported with the high schools. In summary, excluding grade 7 and 8 general math, which is required by most schools, female enrollment exceeds male enrollment in junior high school mathematics except in remedial math.

Enrollment in Junior High School Mathematics by Sex and by Community Size Type and School Size

Table 15 shows that female enrollment exceeds male enrollment in pre-algebra, elementary algebra, and intermediate algebra in all community types. Female enrollment also exceeds that of males in remedial math-grades 7 and 8 in rural schools, but is less than male enrollment in central city, suburban, and independent city junior high schools.

Female enrollment exceeds male enrollment in pre-algebra, elementary algebra, and intermediate algebra in every school size category (see Table 16). Male enrollment significantly exceeds female enrollment in remedial math in every school size. As school size increases, there is a greater percentage of both males and females who are enrolled in remedial math, but the percentage differences between the two become smaller.

TABLE 14. PERCENT ENROLLMENT IN SELECTED JUNIOR HIGH SCHOOL MATHEMATICS COURSES BY SEX

Course Title	Male	Female	% Male > Female
Pre-Algebra	0.41	0.51	-19.6
Elementary Algebra	5.55	6.52	-14.8
Intermediate Algebra	1.81	2.12	-14.6
Remedial Math Gr 7-8	3.45	2.74	25.9

TABLE 15. PERCENT RELATIVE DIFFERENCE IN MALE AND FEMALE ENROLLMENTS IN SELECTED JUNIOR HIGH SCHOOL MATH COURSES BY COMMUNITY TYPE (Male Percent Relative to Female Percent Shown)

Course Title	Central City	Suburb	Independent City	Rural
Pre-Algebra	-30.8	-20.4	0.0	-53.8
Elementary Algebra	-20.8	-8.6	-9.8	-44.9
Intermediate Algebra	20.1	9.7	-10.9	-32.5
Remedial Math Gr 7-8	28.1	35.5	22.6	-12.5

TABLE 16. PERCENT RELATIVE DIFFERENCE IN MALE AND FEMALE ENROLLMENT IN SELECTED JUNIOR HIGH SCHOOL MATHEMATICS COURSES BY SCHOOL SIZE (Male Percent Relative to Female Percent Shown)

Course Title	< 200	200-499	500-999	1000 or >
Pre-Algebra	-55.6	-12.5	-20.7	--
Elementary Algebra	-20.8	-20.3	11.0	-22.0
Intermediate Algebra	-25.0	-16.4	-15.6	-5.8
Remedial Math Gr 7-8	37.4	43.7	18.4	16.5

NOTE: For these tables negative percents indicate male enrollment is less than female enrollment.

SUMMARY AND GENERAL CONCLUSIONS

The typical mathematics program in both junior high and high schools varies little throughout the state in terms of predominant course offerings and percent of student enrollment. Differences do occur in enrollment for schools of different sizes and community type with community type appearing to be the best indicator of differences.

Required status accounts for a very small percent of enrollment in most typical math courses in high schools. Suburban and rural schools have the highest number of required math courses, central city schools typically require only two, and independent city schools require but two which account for about 2% of the enrollment.

Required status accounts for most of the enrollment in grades 7 and 8 general math. Required remedial math-grades 7 and 8 accounts for 18% of enrollment in that course suggesting that it is required for those students who do not have the skill to enroll in another course to fulfill a math requirement.

The data show that male enrollment in high school mathematics is greater than that of females in nine of the eleven courses which have most of the math enrollment. The reason for this difference needs to be investigated. With the exception of remedial math, female enrollment in grades 7 and 8 math exceeds that of males.

Mathematics courses with the highest enrollments are elementary algebra, intermediate algebra, elementary general math, plane geometry, and remedial math. Twenty-three courses enroll less than 1% each of the state total, but notable courses in this group are independent study, calculus, consumer math, analytic geometry, plus probability and statistics.

Decreases in high school enrollment that are projected through 1990 will probably not change the predominant course offerings in mathematics. Community type, not school size, is more influential in determining what courses are offered.

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